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The Lichen Genus *Siphula* Fr. (Lecanorales) in East Asia

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Based on observation of specimens preserved in TNS, the widespread lichen *Siphula decumbens* Nyl. is also reported from Japan, Taiwan and China. The occurrence of *S. ceratites* in Japan is confirmed. Some reports of other *Siphula* species in the region are discussed briefly.

Key words: East Asia, *Siphula*, *Siphula decumbens*.

The lichen genus *Siphula* Fr. is rather widely distributed throughout the world, but displays major centres of speciation in the Southern Hemisphere, especially in temperate Australasia (including Tasmania and New Zealand) (Kantvilas 1987, 1994, 1996, 1998, 2004), southern Africa and the Mascarene Islands (Mathey 1974), and southern South America (Kantvilas 2002, Kantvilas and Elix 2002). In tropical latitudes, the genus becomes predominantly montane, and additional concentrations of species occur in the tropical American highlands (Kantvilas and Elix 2002) and the Malesian region (including New Guinea) (Kantvilas 2002). Reports of *Siphula* from Asia are very scattered and the genus clearly has a very sporadic distribution in the area; in some cases, records of *Siphula* in Asia have been based on mis-identifications (e. g., Obermayer and Kantvilas 2003).

A recent opportunity for the first author to study the collections of *Siphula* held in the herbarium of the National Science Museum, Tokyo (TNS) has revealed some interesting new records of *Siphula* from East Asia. These records are reported here. The occurrence of *Siphula* in Asia in general is also discussed briefly.

Material and Methods

The study is based on collections in TNS, which were examined morphologically and chemically. Chemical analyses using thin-layer chromatography follow standard methods (Culberson and Kristinsson 1970, Culberson 1972).

Results

The genus *Siphula* in the East Asian region

1. **Siphula ceratites** (Wahlenb.) Fr., Lichenogr. Europ. Reform.: 406 (1831).

Baeomyces ceratites Wahlenb., Flora Lappon.: 459 (1812).

For synonymy see Kantvilas (2002).

Morphology: Thallus forming loose swards or tufts on soil. Lobes erect, terete to subterete, simple or sparingly branched, antler-like, to 50(–70) mm tall, 0.5–1.5(–2) mm wide; surface smooth, longitudinally striate or plicate, chalky white, ivory to pale beigegrey; apices generally blunt and rounded (see also Purvis 1992).

Chemical composition: siphulin, appearing in short-wave UV light as a pale spot with low Rf, becoming yellow; UV+ dull brownish after treatment with acid and heat. Sometimes together with traces of siphulin-like compounds. These compounds are concentrated mainly in the cortex or outer parts of the medulla, hence the spot test reactions given below are best carried out on the cortex. Cortex and medulla P–, K+ yellow-orange, KC+ fleeting violet, soon yellow-orange, C+ fleeting violet, soon yellow-orange, UV+ pale yellowish. The presence of siphulin is diagnostic, and this compound is known only in two other taxa, *S. pteruloides* Nyl. and *S. carassana* Müll. Arg., both confined to the Neotropics.

Notes: *Siphula ceratites* is very widespread in cold, treeless environments of the northern parts of the North American and Eurasian continents. It is also known from the Himalayas, with a disjunct, southernmost occurrence in New Guinea. This species was first recorded from Japan by Sato (1935) and was subsequently cited by Kurokawa (2003). The record derived from a single, undated specimen from Mt. Kasagadake, Kohzuke Prov. (Gunma Pref.), Honshu, a locality that is likely to have become significantly ecologically degraded in recent times. This specimen has typical morphology and contains siphulin with traces of two, associated compounds with a lower Rf.

Specimen examined: **Japan**: Honshu, Prov. Kohzuke, Mt Kasagadake, A. Tsunoda s. n. (TNS).

2. **Siphula decumbens** Nyl., Lich. Nov. Zel.: 14 (1888).

For synonymy see Kantvilas (1998).

Morphology: Thallus in tufts or extensive

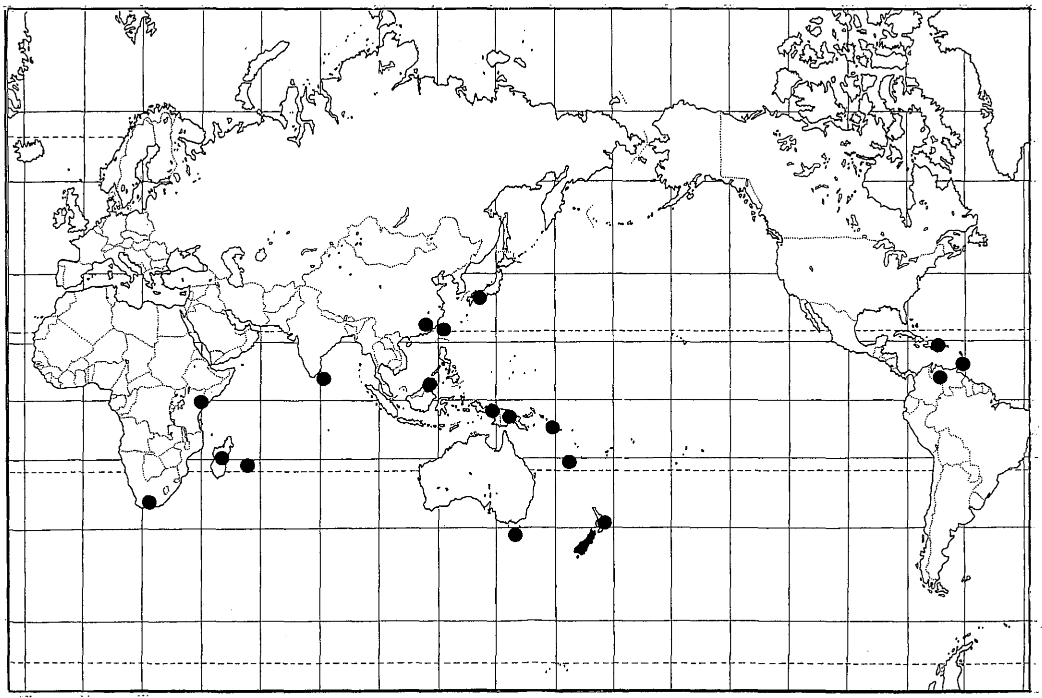

Fig. 1. Distribution of *Siphula decumbens*. All general geographical occurrence has been confirmed by the specimens studied, with the exception of the East African record which is based on Krog (1991).

swards on soil, rocks, rotting wood or bark of living trees. Lobes very variable, erect, ascending or decumbent, generally broadly flattened, simple or irregularly branched and divided; main lobes 10–20(–45) mm tall, 1–5(–15) mm wide; ultimate branches and lobules 0.5–2 mm wide, sometimes rather subterete; surface chalky white to pale cream, sometimes becoming pale pink in the herbarium, dimpled, areolate, frequently intensely mealy and scabrid, sometimes fenestrate; apices rounded and entire, or very ragged, lobulate or nodulose (see Kantvilas 1998 for a more detailed description).

Chemical composition: thamnolic acid, with traces of decarboxythamnolic acid. Cortex and medulla P+ orange, K+ intense yellow, becoming reddish brown, KC–, C–, UV–.

Notes: This species is very widespread (Fig. 1) and is known from the East African highlands, southern Africa, tropical America, Borneo, the Caribbean, Guadalcanal, New Guinea, New Caledonia, New Zealand, Madagascar, Reunion, Sri Lanka and Tasmania (Kantvilas 1998, 2002). To this extensive distribution can now be added Taiwan, China and Japan, representing major range extensions of this predominantly Southern Hemisphere lichen into the Northern Hemisphere (Fig. 1). It is noteworthy that to date, *S. decumbens* has not been recorded from mainland Australia or southern South America, especially as it is a conspicuous species and both regions have been explored by experienced lichenologists at least to some extent.

Siphula decumbens is an extremely variable species but much of its morphological variation can be interpreted in terms of habitat factors (Kantvilas 1998). Nevertheless, following extensive field studies, two closely related, thamnolic acid-containing species have been recognized in Australasia: *S. gracilis* Kantvilas, with very elongate, slender, simple to sparsely branched lobes (Kantvilas 1998) and *S. australiensis* Kantvilas, an essentially foliose species with rounded, shell-like lobes (Kantvilas 2004). The status of the Mascarene species, *S. mascarena* Mathey, and its relationships with *S. decumbens* remain unresolved.

The Asian specimens reported here are all rather similar to each other and fall within the broad morphological range of *S. decumbens* as currently circumscribed (Kantvilas 1998). They have essentially decumbent, overlapping main lobes (Figs. 2a, b), (0.5–)1–3 mm wide, with a puckered and dimpled, sometimes fenestrate, but not markedly scabrid or mealy surface. The lobes are irregularly branched and divided, with ragged apices, and with the ultimate branchlets typically ascending to erect, ca. 0.2 mm wide, very brittle, nodulose and subterete. One specimen (Kashiwadani 39425) comprises caespitose clumps of such subterete lobes and lobules (Fig. 2c). The Japanese specimen was previously curated under a nomen nudum '*Siphula sikokiana* Asahina'. This specimen appears to have been collected from humic soil and rotting wood growing with *Odontoshisma denudatum* (Mart.) Dumort., and its decumbent, puckered, fenestrate lobes suggest a moist, shaded habitat. The specimen from Taiwan is very similar and appears to have been collected from wood.

Specimens examined: **Japan**: Shikoku, Prov. Tosa, Mt Ohdo-yama, Umaji-mura, 1 Aug. 1931, F. Fujikawa s .n. (TNS). **Taiwan** (Formosa): Taitung Pref., Mt Lachialachiaerh, 1800–2200 m alt., 21 Jan. 1965, S. Kurokawa 2355 (TNS). **China**: Jianxi Sang, Ganzhou Region, Longnan Co., Mt. Huangniushi, Jiulianshan Mts., on rock, 1300 m alt., 21 July 1995, H. Kashiwadani 39425 (TNS); same locality, on bark of Castanopsis, ca. 1000 m alt., 21 July 1995, H. Kashiwadani 39452 (TNS).

Misidentification or doubtful record

1. *Siphula fuscidula* Zahlbr. and *S. fuscidula* var. *minor* Zahlbr.

Both of these names are synonyms for the

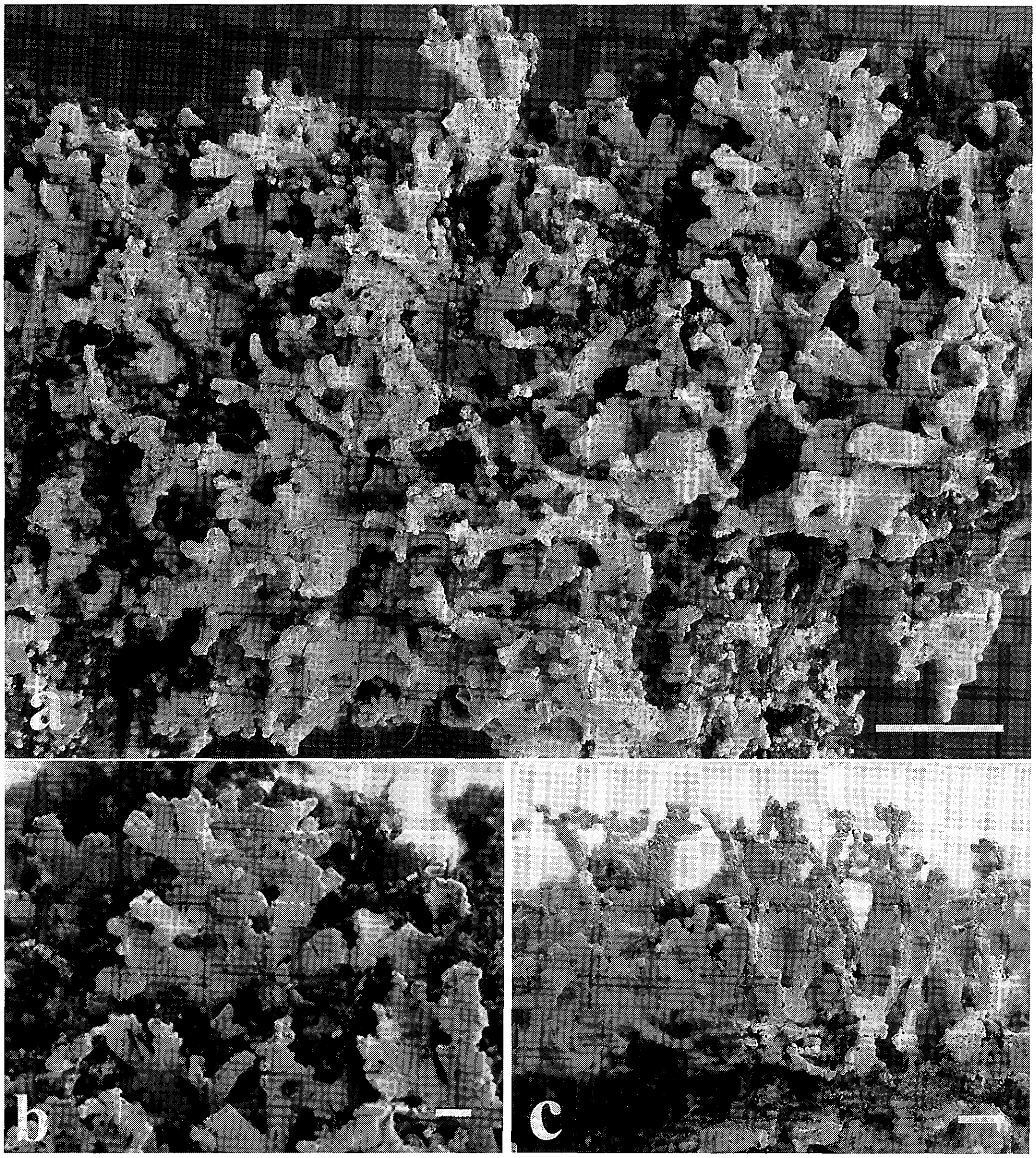

Fig. 2. *Siphula decumbens*. a: General view showing typical, broad, decumbent lobes (F. Fujikawa s. n., TNS). b: Lobe details of the same specimen. c: Specimen with narrow, erect lobes (H. Kashiwadani 39425, TNS). Scale = 1 mm.

widespread, cool to cold temperate, Northern Hemisphere lichen *Sphaerophorus fragilis* (L.) Pers. (Spherophoraceae).

2. *Siphula cladonioidea* Vainio

This taxon is now recognised as a species in the family Verrucariaceae and is known as *Neocatapyrenium cladonioideum* (Vainio) Harada.

3. *Siphula himalayensis* (Räsänen) Kantvilas

This Himalayan species has been shown by Obermayer and Kantvilas (2003) to be an extreme, fruticose form of the normally crustose lichen, *Lecanora geophila* (Th. Fr.) Poelt. Elaborately developed, somewhat *Siphula*-like thalli in crustose lichens growing in extreme environments are not unusual (Obermayer and Kantvilas 2003). In TNS, there are collections from Sikkim and Nepal of unusual, terricolous, fruticose lichen, labeled '*Siphula contorta*'. These specimens contain atranorin, alectoronic and -collatollic acids, and one has a few lecanorine apothecia with the anatomy, crimson internal pigmentation and simple spores typical of the genus *Tephromela*. This material is *T. siphulodes* Poelt & Grube, described originally from Nepal (Poelt and Grube 1993). It remains to be seen whether this taxon is distinct from the widespread *T. atra* (Huds.) Hafellner ex Kalb, or whether it is simply a very elaborate morphotype adapted to growth in an extreme environment.

4. *Siphula pteruloides* Nyl.

This species has been recorded from China by Wei (1991). However, to our knowledge, *S. pteruloides* is confined entirely to the Neotropics (Kantvilas and Elix 2002), and all the occasional records of this lichen from elsewhere have proved to be incorrect. Although no Chinese specimens have been examined, this record can be considered highly doubtful.

The following specimen, seen and examined in TNS, represents a significant northern range extension of this species into Mexico; previously this species was known to us only from as far north as Costa Rica.

Mexico: Oaxaca, between Jacatepec and gap of the road, ca. 2970 m altitude, 27 Dec. 1970, S. Nakanishi 376 (TNS).

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G. カンタヴィラス[a]，柏谷博之[b]，文　光喜[c]：東アジアのシロツノゴケ属（チャシブゴケ目）

東アジアから報告のあるシロツノゴケ属について分類学的検討を行った．本属の日本産種としてはシロツノゴケ（*Siphula ceratites*）が群馬県笠ヶ岳産の標本をもとに報告されている（佐藤 1935）．しかし引用された標本が最近まで所在不明であったため本種が日本に実在する確証が得られていなかった．最近になって筆者の一人文は故朝比奈泰彦博士から国立科学博物館に寄贈された標本の中に，かつて佐藤博士によって引用された笠ヶ岳産の標本を見つけ出し，再検討の結果シロツノゴケであることを再確認した．この標本は角田愛花（金五郎）氏によって採集されたものであるが，採集年月日は不明である．シロツノゴケはユーラシア大陸，北米大陸の冷涼な気候を好んで生育し，アジアではヒマラヤとニューギニアから報告されている．日本を含む東アジアからの報告はこれ以外にはない，国内でもその後採集された記録はない．

Siphula decumbens（コバノシロツノゴケ，新称）は温帯から熱帯に広く分布する．アジアではニューギニアとスリランカに生育することが知られていたが東アジアからの報告はなかった．今回，国立科学博物館に保管されている本属の標本を精査した結果，日本，台湾，中国で採集された標本が見つかり，その東アジアにおける分布域は温帯域まで広がっていることが明らかになった．日本では高知県馬路村大戸山で1931年に一度だけ採集されているが，その後採集された記録はない．コバノシロツノゴケの地衣体は小型で高さ 3–5 mm，数回分枝しタムノール酸を含むので，地衣体が大型で高さ長さ 50 mm，柱状でほとんど分枝せず，シフリンを含むシロツノゴケとは容易に区別できる．

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